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Factsheet

BEEF BREEDING TERMS DEFINED

(Revision of Factsheet "Beef Breeding Terms Defined", January 1988)

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The productivity, efficiency and profitability of beef production can be increased through the use of a well-planned breeding program. Traits that affect profitability may be selected for or against by carefully choosing which animals to use for breeding purposes. The genetic merit of animals must be known in order to make progress in a breeding program. Programs designed to identify genetic merit include: Ontario Beef Herd Improvement Program (BHIP); Ontario Bull Evaluation Program; and the Canadian Beef Sire Evaluation Program. In order to make effective use of the information supplied by these programs, the beef producer must first understand certain terms and phrases. Definitions relating specifically to the above three programs appear in later sections, while the following definitions could apply to any performance testing program.

Accuracy

A measure of agreement between an animal's estimated breeding value for a trait and its genetic merit for that trait.

Adjusted Weaning Weight

Actual weight taken near weaning adjusted to 200 days of age, to a mature dam basis, and for sex of calf

Adjusted Yearling Weight

A weight taken postweaning adjusted to 365 days of age, to a mature dam basis, and for sex of calf.

Breed

Animals descended from common ancestors. A breed exhibits common characteristics due to restricted exchange of genetic material with other populations.

Breeding Value

The actual genetic merit of an animal for a given trait. Though it cannot be measured, breeding value can be estimated using performance records (see Estimated Breeding Value).

Calf Crop Percent

The percent of cows exposed for breeding which subsequently wean a calf.

Central Test Station

A facility in which animals from different herds are compared under similar conditions for performance traits.

Complementarity

The combining of breeds or individual animals that have characteristics that complement each other, thereby obtaining optimum progeny characteristics. This usually involves the use of sire lines (high growth rate, muscling) and dam lines (high fertility and milk yield), particularly when terminal crossbreeding is used.

Contemporary Group

A group of animals, similar in age, managed uniformly and kept together in the same environment (see Management Group).

Correlation

A measure (ranging from -1.0 to +1.0) of how two traits vary together. A positive correlation indicates that as trait A increases, trait B also increases. A negative correlation would indicate that as trait A increases trait B would decrease. It is not an indicator of cause and effect, only of relationship.

Crossbreeding

The mating of animals of different breeds. Advantages include complementarity and heterosis (see OMAF Factsheet, *Crossbreeding Systems for Commercial Beef Production*, Agdex 420/36).

Culling

The removal of less productive or less desirable animals from the herd.

Direct Effect

For weaning weight, that portion of preweaning growth that is due to the calf's genetics (see Maternal Effect).

Environment

The total of all non-genetic influences such as housing, feed, weather, and management practices which may affect animal performance.

Estimated Breeding Value (EBV)

An estimate of an animal's breeding value, (genetic merit for a given trait), based on the performance of the individual and its relatives. Estimated breeding values are expressed as a difference from breed average.

Expected Progeny Difference (EPD)

The expected difference between the average performance of progeny of an individual animal and breed average. An animal's EPD equals 1/2 of its EBV.

$$\underline{\text{Sire}}\ \text{EPD} = 1/2\ \text{EBV} \quad \times \quad \underline{\text{Dam}}\ \text{EPD} = 1/2\ \text{EBV}$$

$$\downarrow$$

Calf

$$\text{EBV} = \text{Sire EPD} + \text{Dam EPD}$$

Feed Conversion

The amount of feed required to achieve one unit of production (e.g., lbs. feed/lb. gain). The age of animal, composition of gain (lean or fat) and environmental factors must be considered when comparing animals for feed conversion or feed efficiency.

Feed Efficiency

The product (usually weight gain) produced per unit of feed consumed (e.g., lbs. gain/lb. feed). See Feed Conversion.)

F1

Offspring resulting from the mating of a purebred bull and a purebred cow of different breeds.

Gene

The basic genetic unit by which characteristics are transmitted from parent to offspring.

Generation Interval

The average length of time between the birth of an animal and the birth of the progeny replacing that animal in the breeding herd.

Genetic Correlation

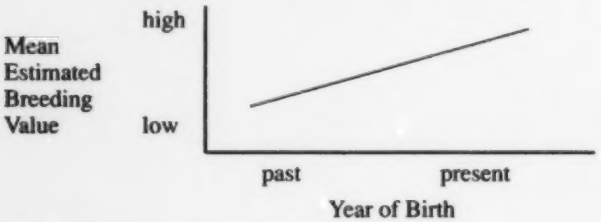
A relationship between two traits that arises because some of the same genes affect both traits.

Genetic Merit

The genetic worth of an animal for a given trait.

Genetic Progress

The increase in average genetic merit of a population for any particular trait as a result of selective breeding. The rate of progress is increased when accuracy, selection intensity or heritability increase or when generation interval decreases. Genetic progress is found as the change in mean estimated breeding value over time.

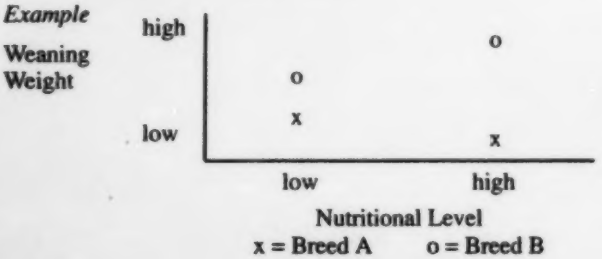


Genotype

The actual genetic make-up or blueprint of an animal as determined by its genes.

Genotype by Environment Interaction

The change in performance of different genotypes from one environment to another.



Superiority of breed B is greater with a high level of nutrition than with a low level.

Half-Sibs

Individuals having either the same sire or the same dam but not both.

Herd Test

A comparison of animals for genetic merit within a herd, (differences between herds are not accounted for).

Heredity

The transmission of characteristics from parents to offspring through genes.

Heritability

The proportion of variation in a trait that is transmitted through genes from parents to progeny.

$$\text{Heritability (\%)} = \frac{\text{Variation due to genetics}}{\text{Observed variation}} \times 100$$

Heterosis (Hybrid Vigor)

The percent difference between the average performance of crossbred offspring and the average performance of their parent breeds.

$$\text{Heterosis (\%)} = \frac{\text{Average Performance of crossbred (AXB) offspring} - \frac{(\text{Average performance of breed A} + \text{Average performance of breed B})}{2}}{\frac{(\text{Average performance of Breed A} + \text{Average performance of Breed B})}{2}} \times 100$$

Identification

A indicator (preferably permanent) of an animal's identity (e.g., tattoo). Identification must be unique for each animal to allow accurate record keeping and estimation of genetic merit.

Inbreeding

The production of offspring from parents more closely related than average.

Linebreeding

A form of inbreeding in which the parents of an individual are related to a common ancestor.

Management Group

A group of animals within a herd that are similar in age, managed uniformly, and kept together in a common environment. For instance, calves that receive special treatment such as creep feed or show preparation should be considered as separate management groups. **The proper assignment of management groups is crucial to the accurate estimation of genetic merit.**

Maternal Effect

For weaning weight, the dam's maternal ability (largely milk yield) influences preweaning growth. Such maternal effects are of interest to producers when selecting replacement heifers.

Mean
The average value for a trait.

Multiple Trait Selection
The simultaneous selection for more than one trait. An example would be the consideration of both birth weight and average daily gain when selecting a herd sire.

Normal Distribution (Bell Curve)
A graph of the number of animals displaying each possible performance level for a trait. Most animals are near the mean, while a few are very good or very poor.

Outcrossing
The mating of individuals within a breed that are less related than average.

Pedigree
An animal's ancestry, usually shown as a family tree.

Performance
The observed values of reproduction, production, and carcass traits for an animal.

Performance Test
The systematic collection of performance information for use in decision making (selection and culling).

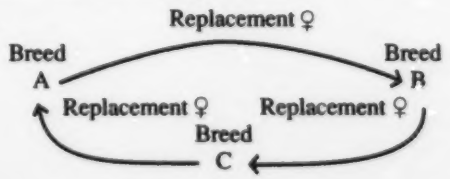
Phenotype
The observed or measured value for an individual for a trait. Phenotype is the sum of genotype plus environment (P = G + E).

Progeny (Offspring)
The sons and daughters of an individual.

Progeny Test
The evaluation of the genotype of an individual through use of records on its progeny.

Rotational Crossbreeding
The systematic crossing of two or more breeds in which crossbred females are mated to bulls of the breed least represented in their genotype. Replacement heifers are chosen from the resulting offspring.

Example:



Selection
The process of deciding which animals will become parents. This decision should be based on estimates of genetic merit.

Selection Intensity
An indication of the percentage of animals which are selected to become parents. Selection intensity increases as the percentage of animals selected decreases.

Sibs (Full Sibs)
Individuals having the same sire and dam.

Straightbreeding
The mating of purebred animals of the same breed.

Terminal Crossbreeding
The systematic crossing of different breeds or crossbreds where all progeny are marketed. Replacement heifers must be obtained from outside the herd.

Example	Crossbred cow (AXB)	X	Bull of Breed (C)
	(ABxC)	calves	(all marketed)

Total Merit
The genetic merit of an animal when all important traits are considered for a specific production system.

Trait
Any measurable or observable characteristic of an animal.

Variation
The degree of difference measured or observed among animals for a trait.

ONTARIO BEEF HERD IMPROVEMENT PROGRAM (BHIP)

This program focuses on productivity and efficiency of the cow herd. By providing objective information on birth, weaning and yearling productivity, this program assists producers in making culling and selection decisions. More information on this program may be obtained from Ontario Ministry of Agriculture and Food county offices. **The following definitions relate specifically to BHIP.**

Adjusted Average Daily Gain (AADG)
Preweaning rate of gain adjusted for age of dam and adjusted to a bull calf basis.

Adjusted Weaning Weight (AWW)
Weaning weight (taken between 120 and 250 days of age) adjusted to 200 days of age, to a mature cow basis and to a bull calf basis.

$$AWW = \text{Birth weight} + (AADG \times 200)$$

Adjusted Yearling Weight (AYW)
Yearling weight (taken 120 to 210 days after the weaning weight date) adjusted to 365 days of age, a mature cow basis and to a bull calf basis.

$$AYW = AWW + (\text{postweaning daily gain} \times 165)$$

Composite Index
A combination of the weaning index and the gain index that allows comparison of heifers for milking ability as shown by their mothers and growth rate simultaneously.

$$\text{Composite index} = \frac{\text{Weaning index} + \text{Gain index}}{2}$$

Gain Index

A measure of postweaning gain relative to others in the same management group.

$$\text{Gain Index} = \frac{\text{Postweaning daily gain of individual}}{\text{Average postweaning daily gain of management group}} \times 100$$

Management Group

A minimum of five animals born within 90 days of each other and managed uniformly in the same environment.

Weaning Index

A measure of preweaning gain of the individual relative to others in the same management group.

$$\text{Weaning index} = \frac{\text{Adjusted preweaning average daily gain of individual}}{\text{Average adjusted preweaning average daily gain of management group}} \times 100$$

ONTARIO BULL EVALUATION PROGRAM

This program compares bulls from different herds for several economically important traits. Measurements include: postweaning growth, backfat, scrotal circumference and height. Feed intake is also measured at some stations. A more complete description of the program can be found in the OMAF Factsheet, *Ontario Bull Evaluation Program*, Agdex 420/41.

Adjustment Period

A 28-30 day period before the start of test during which bulls adjust to their new surroundings (e.g., penmates, housing, feed). This period helps to eliminate effects of pretest environment on test centre daily gain.

Average Daily Gain (ADG)

An estimate of daily weight gain calculated using all weights taken at 28-day intervals. Bulls cannot be compared accurately across stations using ADG due to the influence of environment (weather, etc.).

Expected Progeny Difference (EPD)

The expected difference between the average performance (lbs. gain during 140 days postweaning) of progeny of an individual bull and breed average progeny performance. Average for each breed is zero. Comparisons cannot be made across breeds.

Across Breed Comparison (ABC)

The expected difference between the average performance (lbs. gain during 140 days postweaning) of progeny of an individual bull and the average progeny performance of all bulls tested, regardless of breed. The ABC allows comparison across breeds.

Backfat

An ultrasonic measurement of fat depth over the ribeye taken on bulls at end of test. Useful as an indicator of finishing ability when end of test weight is considered.

Hip Height

An end of test measurement of height at the hooks that may be used as an indicator of body type or conformation. Visual inspection, where possible, will allow a better evaluation of conformation.

Scrotal Circumference

The circumference of the scrotum (SC) is measured at the end of test. Scrotal Circumference may be used to identify potential unsuccessful breeders (very small scrotal circumference) and as an indicator of age at puberty of daughters.

CANADIAN BEEF SIRE EVALUATION PROGRAM

The purpose of this program is to provide genetic evaluations of beef bulls on a national scale for traits of economic importance, based on the performance of their relatives (including progeny) in Canadian recording programs. Traits included are calving ease, maternal calving ease, preweaning gain, maternal milk and gain to yearling. Results are summarized twice yearly and are available at Ontario Ministry of Agriculture and Food county offices.

Expected Progeny Difference (EPD)

The expected diference between the average performance of progeny of an animal and breed average progeny performance.

Calving Ease

A positive EPD indicates an expected reduction in incidence of calving difficulty. Relationship between EPD and percent calving difficulty is breed specific, and is shown in the summary.

Maternal Calving Ease

A positive EPD indicates an expected reduction in incidence of calving difficulty when daughters of this bull give birth. Relationship between EPD and percent calving difficulty is breed specific, and is shown in the summary.

Weaning Gain

The increase (positive EPD) or decrease (negative EPD) in weaning gain (lb. birth to weaning) from breed average expected from the use of a specific sire.

Maternal Milk

The increase (positive EPD) or decrease (negative EPD) relative to breed average in preweaning gain (lb.) of grand progeny of this bull, due to daughters' milk yield.

Yearling Gain

The increase (positive EPD) or decrease (negative EPD) in yearling gain (lb. birth to yearling) from breed average expected from the use of a specific sire.

Rank

The ranking of a particular bull for a given trait relative to all reported proven bulls within the same breed.

Information supplied by the programs described above should be used to form a package of information for a given animal. With this knowledge at hand, producers will be better equipped to make wise breeding decisions.

References

Beef Production Glossary, BIF:FS1, Beef Improvement Federation.

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